

REMARKS

Applicants have studied the Office Action dated April 7, 2004 and have made amendments to the claims. It is submitted that the application, as amended, is in condition for allowance. Claims 1, 3-12, and 14-24 are pending. Claims 2 and 13 have been canceled without prejudice. Claims 1, 3-12, 14, and 17-22 have been amended, and new claims 23 and 24 have been added. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks are respectfully requested.

The specification has been carefully amended to correct minor errors. No new matter has been added.

Claims 1, 8, 10, 12, 19, and 21 were rejected under 35 U.S.C. §102(e) as being anticipated by Kwek et al. (U.S. Patent No. 6,774,736). Claims 2-7, 9, 11, 13-18, 20, and 22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kwek et al. in view of Gomez et al. (U.S. Patent Application Publication No. 2002/0008593). Claims 2 and 13 have been canceled so, with respect to these claims, these rejections are moot. With respect to claims 1, 3-12, and 14-22, these rejections are respectfully traversed.

The present invention is directed to voltage-controlled oscillators that utilize varactors. One embodiment of the present invention provides a voltage-controlled oscillator that includes an oscillating circuit and an active circuit. The oscillating circuit includes an inductive circuit and a capacitive circuit connected to a first main terminal with a first main terminal voltage and a second main terminal with a second main terminal voltage. The active circuit is connected to the first and second main terminals for maintaining an oscillatory transfer of electrical energy between the inductive circuit and the capacitive circuit at a frequency dependent on the capacitance of the capacitive circuit, with this capacitance varying as a function of an adjustable control voltage.

The capacitive circuit includes at least two circuit branches connected in parallel. Each of the circuit branches includes a first half, a central terminal, and a second half. The first half and the second half each comprise at least one capacitive element of variable capacitance, with

the at least one capacitive element of the first half being coupled in series with the at least one capacitive element of the second half between the first main terminal and the second main terminal. The control voltage is applied to the central terminal of each of the circuit branches, and each of the circuit branches is biased by a different biasing voltages. The first half of each circuit branch includes a first outermost terminal with a first voltage proportional to the first main terminal voltage shifted by the biasing voltage of that circuit branch, and the second half of each circuit branch includes a second outermost terminal with a second voltage proportional to the second main terminal voltage shifted by the biasing voltage of that circuit branch.

As recognized by the Examiner, the Kwek reference fails to disclose a capacitive circuit having multiple circuit branches connected in parallel. However, the Examiner went on to state that the Gomez reference makes up for this deficiency in the disclosure of Kwek. This position of the Examiner is respectfully traversed.

The Gomez reference is directed to an oscillator having multiple varactors. However, Gomez does not disclose a voltage-controlled oscillator that includes an oscillating circuit having a capacitive circuit including at least two circuit branches connected in parallel that each have at least one capacitive element of variable capacitance, with the adjustable control voltage applied to a central terminal of each of the circuit branches, and each of the circuit branches being biased by a different biasing voltage, as is recited in amended claim 1. Amended claim 12 contains similar recitations.

While Gomez does disclose an oscillator having multiple circuit branches connected in parallel, in the oscillator of Gomez a different control voltage is applied to the central terminal of each of the circuit branches. As shown in Figures 2 and 3, a first control voltage 34A is applied to a first circuit branch that includes varactors 26A and 26B, a second control voltage 34B is applied to a second circuit branch that includes varactors 28A and 28B, and a third control voltage 34C is applied to a third circuit branch that includes varactors 30A and 30B. Additionally, in the oscillator of Gomez, the same biasing voltage is applied to the outermost terminals of all of the circuit branches. Thus, Gomez discloses an oscillator circuit in which the

varactors of each circuit branch are controlled by a different control voltage, and all of the varactors of all of the circuit branches are biased by a common biasing voltage.

In contrast, in embodiments of the present invention, the oscillator includes a capacitive circuit having at least two circuit branches connected in parallel. Each of the circuit branches has a first half, a central terminal, and a second half, with the first half and the second half each including at least one capacitive element of variable capacitance. The same control voltage is applied to the central terminals of all of the circuit branches, and a different biasing voltage is applied to each of the circuit branches. The first half of each circuit branch includes a first outermost terminal with a first voltage proportional to the first main terminal voltage shifted by the biasing voltage of that circuit branch, and the second half of each circuit branch includes a second outermost terminal with a second voltage proportional to the second main terminal voltage shifted by the biasing voltage of that circuit branch. In other words, all of the varactors of all of the circuit branches are controlled by a common control voltage, and the varactors of each circuit branch are biased by different biasing voltages. Because a common control voltage signal is used to control all of the circuit branches and different fixed biasing voltages are applied to bias the different circuit branches, embodiments of the present invention do not require a complex folding circuit.

Kwek and Gomez both fail to teach or suggest a voltage-controlled oscillator that includes an oscillating circuit having a capacitive circuit including at least two circuit branches connected in parallel that each have at least one capacitive element of variable capacitance, with the adjustable control voltage applied to a central terminal of each of the circuit branches, and each of the circuit branches being biased by a different biasing voltage. Applicants believe that the differences between Kwek, Gomez, and the present invention are clear in claims 1 and 12, which set forth various embodiments of the present invention. Thus, amended claims 1 and 12 distinguish over the Kwek and Gomez references, and the rejection of these claims under 35 U.S.C. § 102(e) should be withdrawn.

As discussed above, claims 1 and 12 distinguish over the Kwek and Gomez references, and thus, claims 3-11 and claims 14-22 (which depend from claims 1 and 12, respectively) also

distinguish over the Kwek and Gomez references. Therefore, it is respectfully submitted that the rejection of claims 1, 3-12, and 14-22 under 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a) should be withdrawn.

Claims 23 and 24 have been added by this amendment, and are provided to further define the invention disclosed in the specification. Claims 23 and 24 are allowable for at least the reasons set forth above with respect to claims 1, 3-12, and 14-22.

Applicants have examined the references cited by the Examiner as pertinent but not relied upon. It is believed that these references neither disclose nor make obvious the invention recited in the present claims. In view of the foregoing, it is respectfully submitted that the application and the claims are in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is invited to call the undersigned attorney at (561) 989-9811 should the Examiner believe a telephone interview would advance the prosecution of the application.

Respectfully submitted,

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